

ECE 6532 / CS 6640/ BIOEN 6640 Image Processing

Assignment 4

General guidelines:

- **Deadline: November 11, 23:59.**
- For book questions, reference for 3rd edition as well as International editions are provided. However, please make sure to validate question numbers in your book with a 3rd edition.

MATLAB question guidelines:

- Name the .m files with the same name as the function.
- You are not allowed to use any functions from the MATLAB Image Processing Toolbox or any other toolboxes in your methods. Only functions that are part of the basic MATLAB package may be used.

Submission guidelines:

- All submissions must be done using Canvas.
- The submission should contain exactly two files - report (pdf) and code + data (zip).
- Do not submit scanned hand written solutions.
- Answers to theoretical questions should be as concise and precise as possible.
- For programming questions, report should contain following:
 - You are required to explain your understanding of the question.
 - Technical details of the method such as any parameters used. If you find a specific value works best, a discussion on findings using other values is required OR the process involved in finding correct set of parameters. You are encouraged to play with different parameter values and discuss and findings.
 - Results and discussion: report the findings and discuss output images with respect to input images and expected output. It is preferable to add any contradictory results, if found, with brief comments about why it should/not be.
- Report would be used for evaluation and code might be verified for correctness as well as to match the results. Results in the report must correspond to results obtained from running the code.

QUESTIONS

1. Question 5.17 from the textbook.
2. Question 5.29 from the textbook.
3. Question 5.30 from the textbook.
4. Wiener filtering
 - a) Implement the Wiener filter. Your function should have the following format
`function Io = WienerReject (I,H,K)`
where I is the degraded input image, H is the degradation in the Fourier domain, K is the parameter for Wiener filtering and Io is the output image.

- b) Using the BlurDegradation function provide on the class webpage to degrade the fingerprint image from the example images. Apply Wiener filtering to the degraded image with various values of K and make a plot of the MSE (between original fingerprint image and filtered result) vs. the K parameter. Roughly what is the optimal value of K in terms of minimizing MSE error? Note that you should get the degradation H from the BlurDegradation function and pass it to your Wiener filter.
- c) Repeat part b) for the boat image.